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Commentary

COMMENTARY – Professional Development

#EUROmicroMOOC: using Twitter to share trends in Microbiology worldwide

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One sentence summary: Trends in Microbiology by Twitter.

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ABSTRACT

Twitter is one of the most popular social media networks that, in recent years, has been increasingly used by researchers as a platform to share science and discuss ongoing work. Despite its popularity, Twitter is not commonly used as a medium to teach science. Here, we summarize the results of #EUROmicroMOOC: the first worldwide Microbiology Massive Open Online Course taught in English using Twitter. Content analytics indicated that more than 3 million users saw posts with the hashtag #EUROmicroMOOC, which resulted in over 42 million Twitter impressions worldwide. These analyses demonstrate that free Microbiology MOOCs shared on Twitter are valuable educational tools that reach broad audiences throughout the world. We also describe our experience teaching an entire Microbiology course using Twitter and provide recommendations when using social media to communicate science to a broad audience.

Keywords: social networks; Twitter; science communication; open access; MOOC

INTRODUCTION

There are currently 3484 million active social media users and the majority use their mobile devices to access social media (Digital 2019 Global Digital Overview). Facebook, YouTube, Instagram, and Twitter are ranked among the most popular digital platforms (Digital 2019 Global Digital Overview). As social media increases in popularity, so has the interest in incorporating these technologies into professional practices and to complement learning and science communication (Thompson 2015). Social media provides scientists with opportunities to communicate directly with the general public. The scientific community can then engage social media users to discuss current social trends and provide evidence-based commentary in discussions about controversial topics, such as the anti-vaccine movement, flat-Earth movement, or the rise of pseudoscience.

Twitter is a free microblogging service that allows millions of users to communicate and interact by posting short messages. Twitter is strongly recommended to faculty and scientists to develop their personal brand, promote their work, improve their skills, share science with society, promote scientific culture, and teach science (Tripathy *et al.* 2017; López-Goñi and Sánchez-Angulo 2018). As a result, most leading scientific journals, societies, research centers, and universities now have active Twitter accounts and a growing number of scientists use this social media platform for professional communication. In fact, it was demonstrated that scientists who engage in outreach activities targeting a general audience also publish more peer-reviewed articles, and are cited more often than scientists that perform less outreach (Ke *et al.* 2017).

When compared with other professional or personal communication tools, Twitter isn't commonly used for teaching activities, especially in the context of Massive Open Online Courses (MOOCs) (Tang and Hew 2017). Over the past decade, MOOCs have dramatically revolutionized long-distance education and, generally, provide high-quality education to students worldwide. Interestingly, all the requirements for an MOOC are available through Twitter: a large audience, free and open registration, accessible online resources, and interactive user forums for students and professors. With more than 320 million active users per month, Twitter has the potential to offer a valuable platform for MOOCs to disseminate knowledge to individuals worldwide. In 2016, a group of Spanish Society for Microbiology (SEM) members launched an initiative to teach, promote, and communicate Microbiology topics as part of an MOOC on Twitter (López-Goñi *et al.* 2016). While this course had a huge National and local impact, the choice of Spanish as the official language used to teach the course limited the reach of this course among international Twitter users. Therefore, we launched and tested a new initiative taught in English under the hashtag #EUROmicroMOOC. Here, we present the results of the first worldwide Microbiology MOOC taught in English via Twitter.

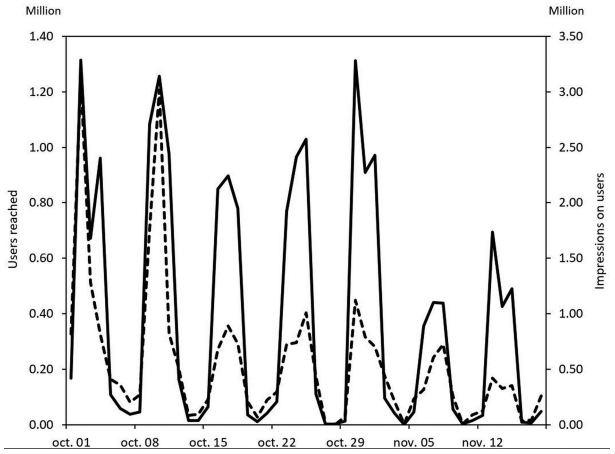

Figure 1. Number of users reached (dashed line) and impressions on users (continuous line) with the hashtag #EUROmicroMOOC, from October 1st to November 18th, 2018. Tracking was made using the software Keyhole.

#EUROmicroMOOC INITIATIVE

#EUROmicroMOOC was organized and coordinated by SEM's 'Teaching and Dissemination of Microbiology' group. The Federation of European Microbiology Societies (FEMS) also collaborated to promote this activity. The lessons were prepared by 21 professionals, affiliated with 20 different universities or research centers in different cities across Europe, the USA, and South Korea. The course layout was designed by the MOOC coordinator (I.L.-G.), who provided Virtual Faculty Members with basic instructions to ensure consistency. Briefly, lectures (lessons) were expected to consist of 30–40 sentences that were each 280 characters or less (tweets). These tweets often included shortened hyperlinks to free on-line materials or *ad hoc* content, related websites, news, and pictures or videos. To deliver science effectively to a general audience outside academia, tweets were written in simple and concise language. To ensure the course was easy to find, the #EUROmicroMOOC hashtag was included in each tweet: 'micro' represented both the course subject, Microbiology, and the fact that the material was being microblogged on Twitter; 'MOOC' is the standard abbreviation for Massive

Figure 2. Location of the posts with the hashtag #EUROmicroMOOC per country. Tracking was made using the software Keyhole. The percentage of males and females who shared posts was 80% and 20%, respectively.

Online Open Course; and 'EURO' because this is the first European Microbiology MOOC delivered via Twitter. The course was taught over seven weeks (02/10/2018 to 15/11/2018), with classes scheduled on Tuesdays, Wednesdays, and Thursdays at 17:00 h (CET). This schedule allowed the tweets to be followed live at a convenient time in most European countries. To maximize visibility, the course was advertised extensively on social media, in Universities, and by scientific institutions in the three weeks prior to the start of the course. The *TweetDeck* (https://tweetdeck.twitter.com/) application was used to post one tweet per minute during each lesson from the @SEMicrobiologica Twitter account. Students were encouraged to follow the course on their personal electronic devices, either live or at a later time by searching Twitter using the hashtag #EUROmicroMOOC.

The course consisted of 21 lectures each focused on a different topic in Microbiology (complete list of lessons in Table S1, supplemental material). The course comprised a total of 738 tweets, 439 images, 74 videos, and 340 hyperlinks to websites related to Microbiology. After each lesson was online, the lesson (tweets) was compiled and made available through *Wakelet* (https://wakelet.com/@SEMicrobiologia). This allows lessons to be easily consulted after the end of the class. Additionally, at the end of the course, the entire course material was stored online using Adobe Spark (https://spark.adobe.com/page/qsnJJVtSzojiW/). Course analytics were determined by tracking the #EUROmicroMOOC hashtag from October 1st to November 18th using Keyhole software. There was a total of 8765 tweets containing the hashtag #EUROmicroMOOC, 85% of which were shared by 'retweeting'. In addition, 3041 388 unique users saw posts containing the #EUROmicroMOOC hashtag and there was a total of 47 295 396 recorded Twitter impressions (times that users have seen a post containing #EUROmicroMOOC; a single user can deliver multiple impressions). Figure 1 compares the number of unique users reached with the number of Twitter impressions over the course. This analysis demonstrates that during the first two weeks there were similar numbers of users and impressions, but during the 3rd to 5th week, the number of impressions stayed consistent while the number of unique users decreased. This suggests that interest in the course was maintained over the first five weeks. However, after the 6th week, the number of impressions decreased, which might suggest that it is more challenging to maintain followers' interests during longer courses. Twitter users worldwide followed the course, the demographics are as follows: 78.4% of users were in Europe, 10.2% in Latin America countries, 5.7% in the USA, and 5.7% in other countries (see Fig. 2). As most of the audience was Spanish, the goal of spreading our MOOC beyond frontiers might not have been fully successful. One potential explanation is that the tweets were sent from the @SEMicrobiologia Twitter account that is predominantly followed by Spanish speaking people (the number of followers for this Twitter account rose to 1.143 users over the seven-week course). We also realise that one limitation of this type of online course is that the knowledge acquired by the followers is not evaluated. In future MOOC editions, we recommend sharing lessons using Twitter accounts followed by English speaking people and to incorporate a survey at the end of each lesson to evaluate learning.

CONCLUSIONS

To our knowledge, #EUROmicroMOOC was the first worldwide online open access Microbiology course taught in English on

Twitter. Past microbiology MOOC initiatives were adapted for Spanish-speaking audiences (López-Goñi *et al*. 2016; López-Goñi and Sánchez-Angulo 2018). When we compare our #EUROmicroMOOC (in English) results with these previous #microMOOCSEM (in Spanish) initiatives, the number of Twitter impressions increased over 10-fold. This experience demonstrates that MOOCs shared on Twitter provide a valuable tool to communicate science to a broad audience and, therefore, promote open science policies to increase the visibility of Microbiology worldwide. Finally, we provide five guidelines for the next microMOOC or anyone who wants to use Twitter as a lesson-delivery platform: (i) instructors should have prior experience using social media for academia and research; (ii) long courses might not captivate followers', therefore limit course programmes to five weeks; (iii) use images, videos, or links in each tweet, as they make your contents more engaging, and use hashtags that are easy to remember and write; (iv) be creative, each tweet should be a headline, that attracts interest; and (v) use simple and concise language, and occasionally include humorous tweets to keep the reader emotionally engaged.

SUPPLEMENTARY DATA

Supplementary data are available at *FEMSLE* online.

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